



Archival Optical Disc System
Government Information Preservation
Working Group

October 5, 2005

Background

Presentation to GIPWoG

October 14, 2003

Concept Proposal – Archival Optical Disc System

- System based on CD, DVD and Blu-ray standard
 - Not a new disc format
 - Read-out compatible with installed base of optical drives
- When disc is recorded in drive,
 - Quality of recording (data) is verified at time of recording
 - System will have ability to monitor “health” of disc each time disc is read to ensure long-term reliability
- Vital information describing recording characteristics is written to disc for on-going audit purposes
 - Timestamp information
 - Version control
 - Drive identifier
- Disc and drive are enhanced and manufactured for true archival applications
 - Features included beyond required standards and specifications

"System" design approach in parallel to other industry efforts to improve media reliability and predictability

Joint Development Efforts

- Developed system specification
- Determined technical feasibility
- Estimated system development costs
- Estimated commercialization timeline
- Scoped business case based on required investments

Business Case

Market Potential

Business Economics - ROI

Substitute / Alternative Approaches

Industry Research Summary

Research Methodology

- Primary and secondary research used to quantify value proposition and determine business potential
 - NIST Preservation Survey
 - Understandings & Solutions
 - McKinsey & Co

Research Methodology



- Quantify expected demand and purchase criteria for archival grade optical media within the US Government



Microsoft
PowerPoint Presentation



- Quantify business opportunity for archival optical system across different industries and markets



Microsoft
PowerPoint Presentation

Key Findings

- No broad-based market opportunity identified outside certain Government Agencies for Archival Optical “System”
- Users generally satisfied with current archiving solutions
- Hardware and software archiving strategies bigger concern than media life expectancy
- Magnetic tape perceived as more stable long-term solution than Optical Disc

Where Imation is going from here

- Archival Optical System Approach
 - System development with Philips put on hold
 - Currently seeking alternative methods to fund system development and commercialization costs
- “Certified” Archival Media Approach
 - Imation has been developing standard CD and DVD media with special features designed for long-term archiving including:
 - Enhanced durability – anti-scratch, anti-static, fingerprint resistant
 - Material and process enhancements

Certified Archival Media Status

- Imation collaborating closely with NIST on design of new predictive test methodologies
 - Media life prediction assurance
 - Objective is “worthy of a NIST supported Seal-of-Approval”
- Promising test results recently demonstrated at Imation
 - Over 2000 hours of environmental testing completed to date following ISO18927 guidelines
- Growing confidence media can carry certification with 50-year projected life expectancy
- Could be available as early as the end of 2005
- Plan to present full data and test summary at next GIPWoG meeting

Key Contact Information

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Market Potential for Archival Grade Optical Media Within the US Government

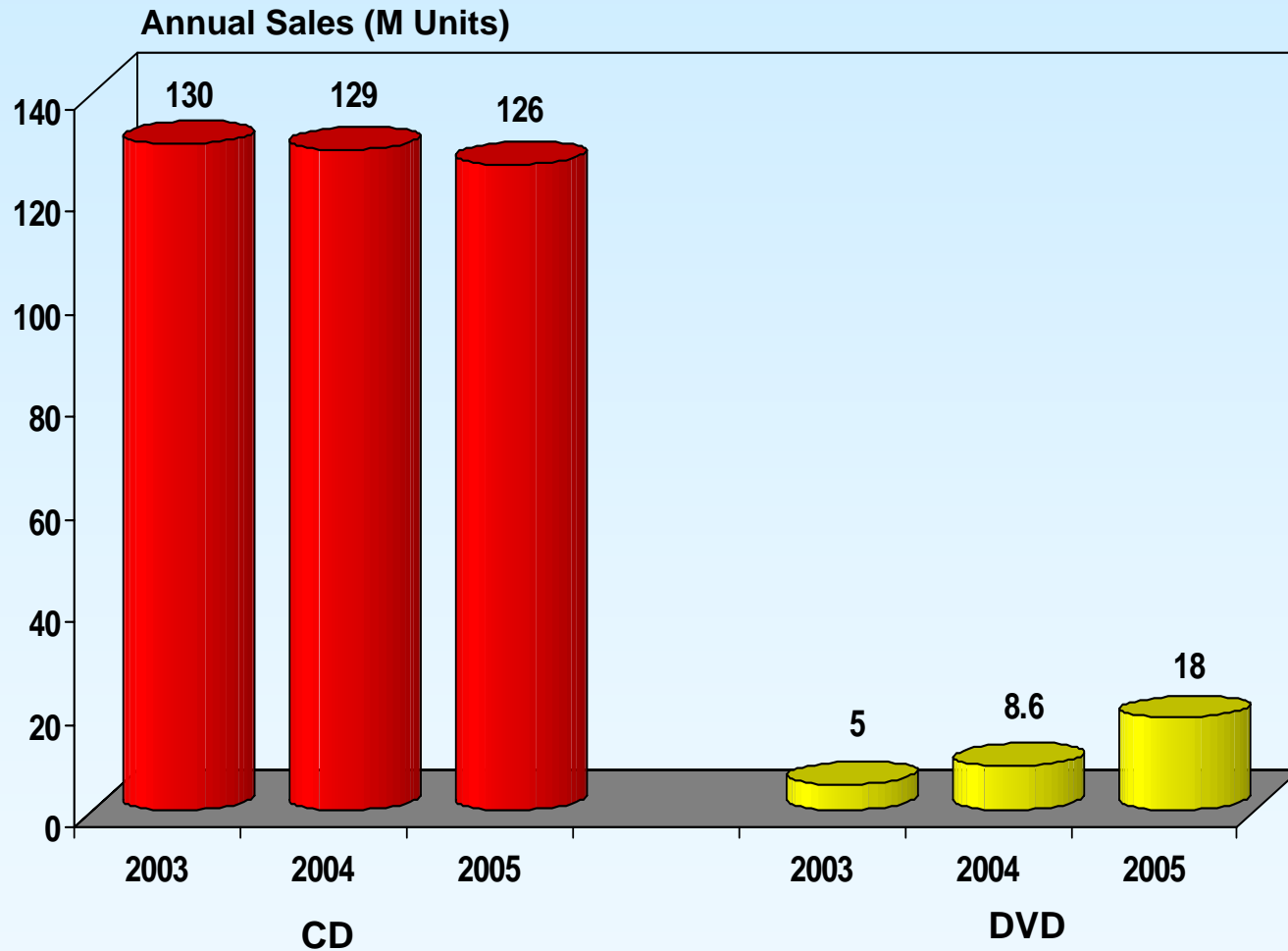
October 2004

Methodology Employed

◆ Terminology

- As discussed and highlighted throughout the report the term 'archival grade' appears to be very subjective
- Where we have shown archival grade in the analysis we are referring to
 - Product which states to have superior archival life in comparison to standard grade
 - DVD authoring product despite having professional applications is disregarded as archival grade
- General grade product which vendors claim to be suitable for archiving is excluded from the archival grade quantification

US Government Demand For Optical Media 2003-2005



The Status of Archival Grade Media within the US Government

- ◆ The perception of what constitutes archival grade media varies between vendors and end-users alike.

- There are a number of products available in the market stating archival grade quality
- Lack of a standard and certification method is a key factor in preventing widespread adoption

NIST leading industry efforts to define and measure

Alternative Technology Overview

- ◆ Data center archiving in which tape is the key media is currently and expected to remain untouchable to optical technology
 - Despite the benefits of fast retrieval and low cost per gigabyte the physical capacity and durability of the media makes it unsuitable.
 - Large scale archives such as those at NASA and USGS remain a low potential market for the adoption of optical technology

Relative Importance of Purchase Criteria of State Agencies Interviewed

Agency	Speed	Brand	Quality	Price	Shelf Life
New York Dept of Public Service	∅	✓✓	✓✓	✓✓✓	∅
DC Water & Sewer Authority	∅	✓✓✓	✓✓	✓✓✓	∅
Maryland Dept of Education	✓	✓	✓✓	✓✓✓	✓
Louisiana Dept of Public Safety	✓	✓✓	✓✓	✓✓✓	✓
North Carolina Utilities Commission	✓	✓	✓✓	✓✓✓	✓
West Virginia Criminal Justices Services	∅	✓✓✓	✓✓	✓✓✓	∅
Virginia Dept of Treasury	✓	✓✓	✓✓	✓✓✓	✓
West Virginia Dept of Education	✓	✓✓	✓✓	✓✓✓	✓
West Virginia State Police	∅	✓✓✓	✓✓	✓✓✓	∅

- ✓ of little or no importance
- ✓✓ of some importance
- ✓✓✓ of significant importance
- ∅ not mentioned

Relative Importance of Purchase Criteria of Federal Agencies Interviewed

Agency	Speed	Brand	Quality	Price	Shelf Life
Department of Education	∅	✓✓	✓✓✓	✓✓✓	∅
NASA - Goddard Flight Centre	NOT CURRENTLY BUYING OPTICAL MEDIA				
NARA	∅	∅	∅	✓✓✓	∅
USGS/EROS	∅	✓✓	✓✓	✓✓✓	∅
DOD - Media Archive	∅	✓✓	✓✓✓	✓	✓✓✓
NASA/JPL	∅	✓✓✓	✓✓✓	✓✓	∅
LOC	NOT CURRENTLY BUYING OPTICAL MEDIA				
EPA	∅	✓✓✓	✓✓	✓✓✓	✓
NOAA/NCDC	∅	✓✓	✓✓✓	✓✓	∅

- ✓ of little or no importance
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Review of Key Purchase Criteria

Price

- ◆ Price in almost all cases has been cited as the most important factor when purchasing optical media
 - Across all State Agencies interviewed it is the clear primary factor
- ◆ Some users prefer to buy from GSA approved contractors due to the perception of best price

End-User Feedback and Requirements

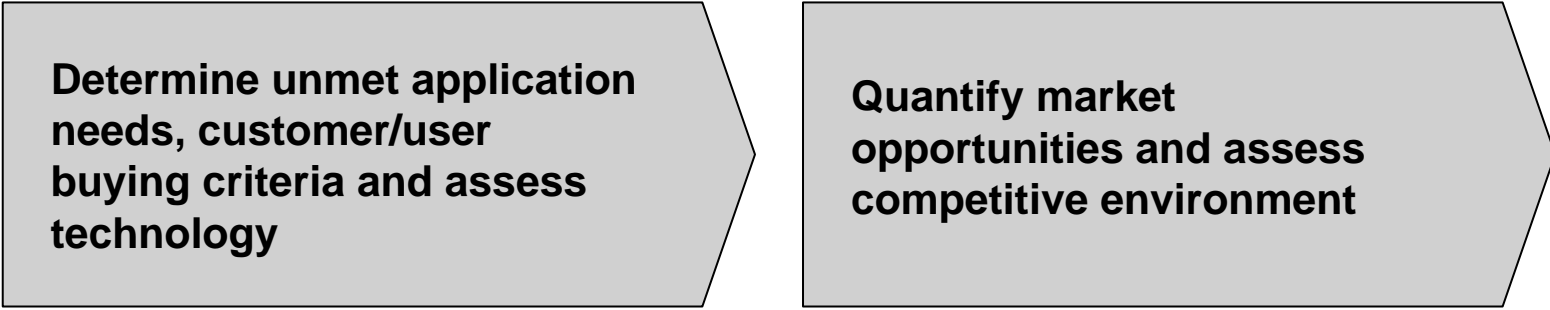
Satisfaction with Existing Archive Solutions

- ◆ There is a strong consensus that current archive solutions are providing satisfactory performance
 - Most users at State and Federal level indicate satisfaction with current technologies

Key Conclusions

- ◆ Price is the single most important purchasing criterion among most government end-users
 - The premium of archival grade media is currently in excess of what the majority of end-users are willing to pay
- ◆ Within archiving solutions tape is still very much entrenched
 - Cost per gigabyte and physical capacity continues to give it a competitive advantage

RESEARCH METHODOLOGY



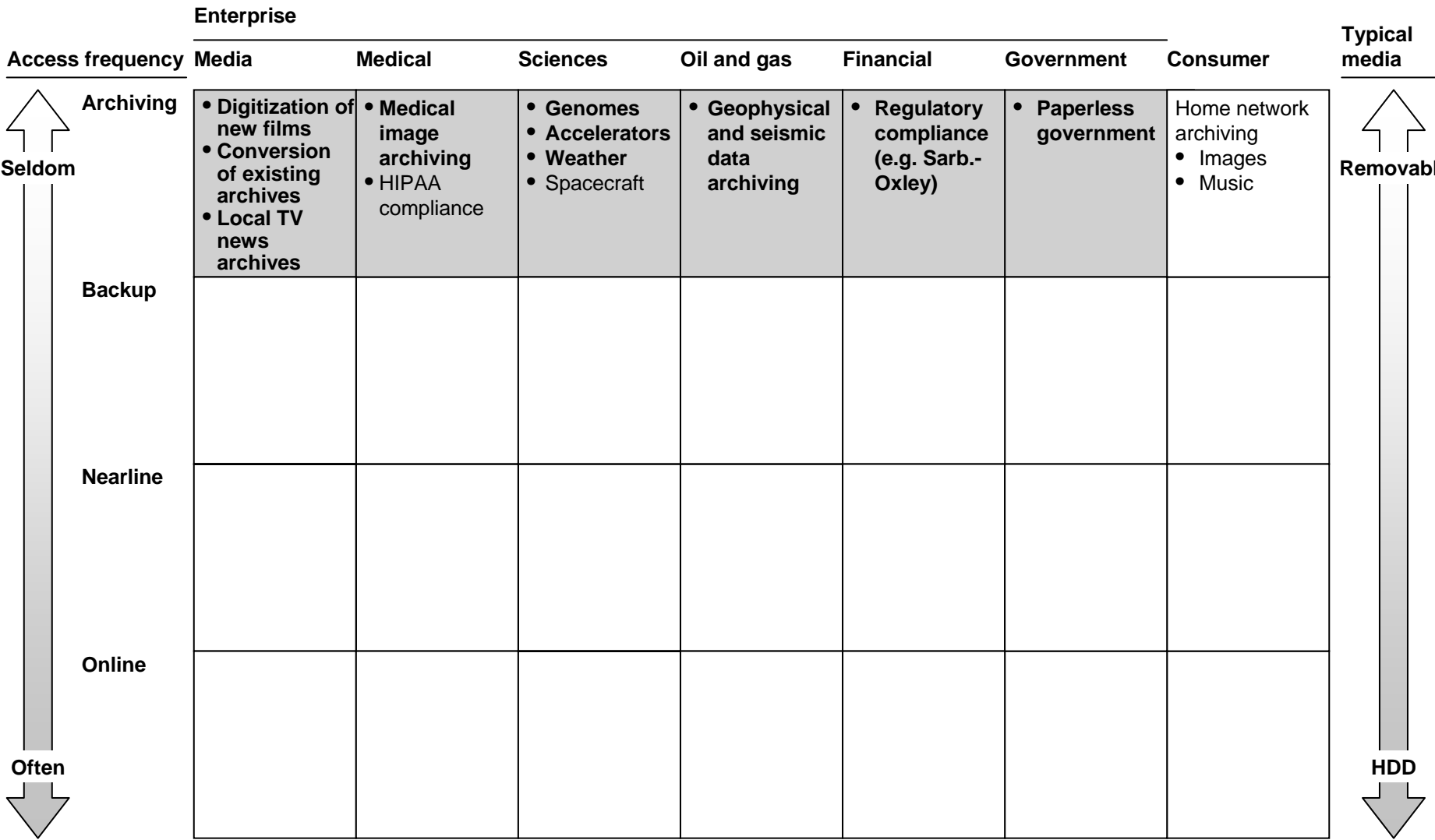
Determine unmet application needs, customer/user buying criteria and assess technology

Quantify market opportunities and assess competitive environment

Process not built on identifying specific technologies or solutions, but by forcing trade-off decisions on specific performance criteria

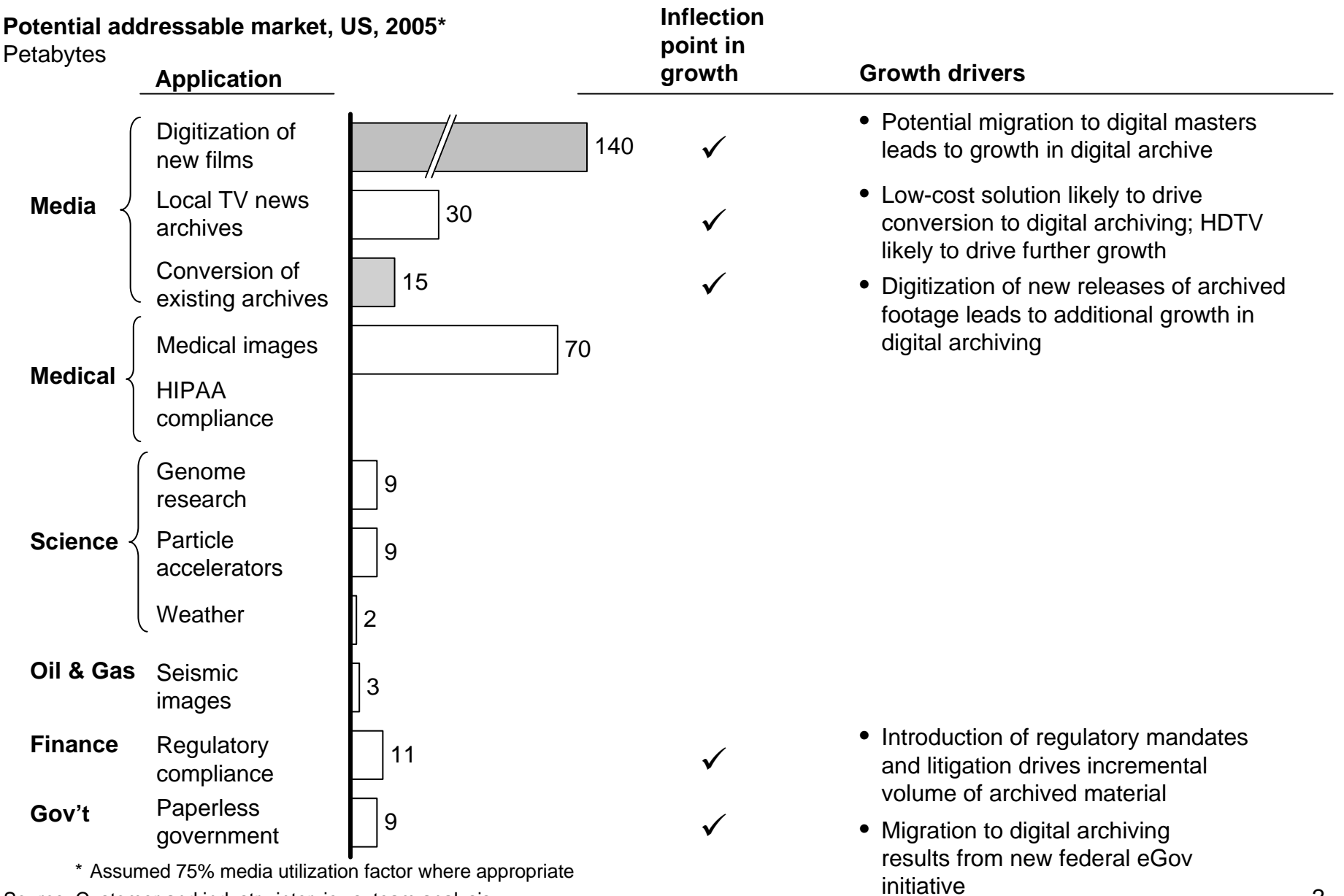
FOCUSED ON 10 ARCHIVING APPLICATIONS IN 6 VERTICALS MARKETS

Landscape of data-intensive applications

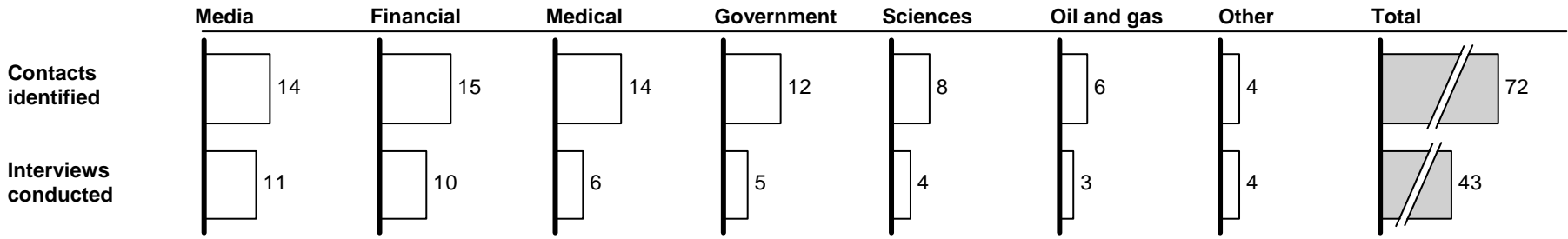


MEDIA, REGULATORY COMPLIANCE AND GOVERNMENT INITIATIVES LIKELY TO DRIVE MOST GROWTH IN DIGITAL ARCHIVING

Potential addressable market, US, 2005*
Petabytes



FORTY-THREE INTERVIEWS WERE COMPLETED



PERFORMANCE CRITERIA ESTABLISHED TO DETERMINE DECISION PROCESS

Security { Integrity
Confidentiality

**Perma-
nence** { Longevity
Durability

Speed { Write
throughput
Read
throughput
Time to data

Other Ease of retrieval
and use

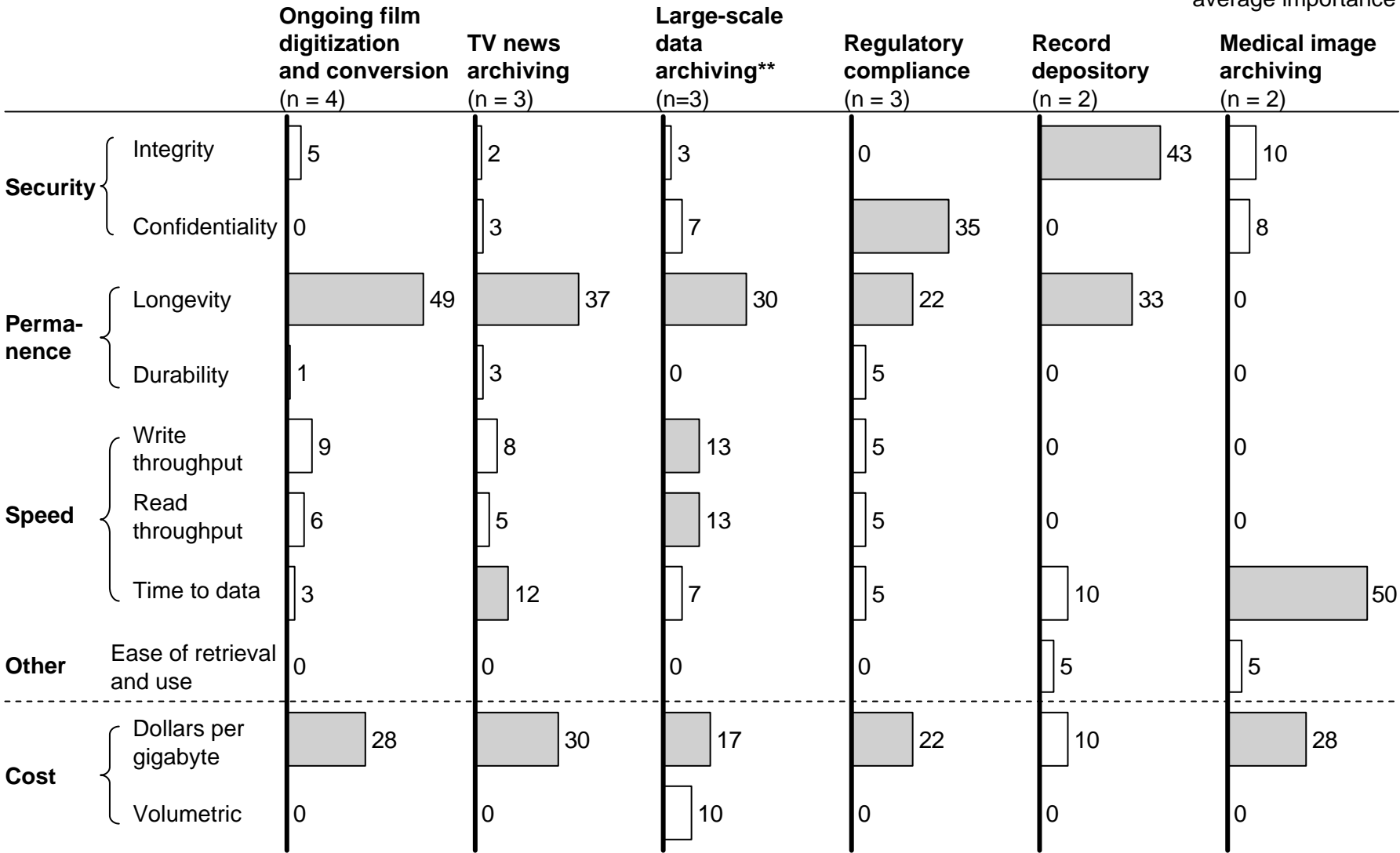
Cost { Dollars per
gigabyte
Volumetric

DECISION CRITERIA VARY GREATLY ACROSS DIFFERENT APPLICATIONS

Importance of decision criteria*

n = # of interviews

Greater than average importance



* 100 points distributed among 10 decision criteria

** Includes seismic image archiving and drug discovery

INTERVIEWS PROVIDED INSIGHT INTO KEY CUSTOMERS' DECISION CRITERIA

	Description	Customer quotes
Security	<ul style="list-style-type: none">Integrity<ul style="list-style-type: none">– WORM– FidelityConfidentiality	<ul style="list-style-type: none">“Physical WORM is not important, though if some regulation came down that required physical WORM, we’d switch to optical.”<ul style="list-style-type: none">– <i>Medical</i>“We’ve been burned because we lost unencrypted tapes in transit.”<ul style="list-style-type: none">– <i>Financial</i>
Permanence	<ul style="list-style-type: none">Longevity<ul style="list-style-type: none">– Physical media life– Hardware obsolescence– Software obsolescenceDurability	<ul style="list-style-type: none">“We obsess over obsolescence, and we’re concerned about forward compatibility of optical media and data formats.”<ul style="list-style-type: none">– <i>Government</i>“We’ve been mandated to keep this data forever. In order to do this, we have been regulated to refresh all of our tapes at least once every 5 years.”<ul style="list-style-type: none">– <i>Science</i>
Speed	<ul style="list-style-type: none">Write speedRead speedTime to data	<ul style="list-style-type: none">“In the TV news business, we are under pressure to make our deadlines; accessing our data quickly can make or break us.”<ul style="list-style-type: none">– <i>Media (TV news)</i>
Cost	<ul style="list-style-type: none">Dollars per gigabyteVolumetric	<ul style="list-style-type: none">“Cost is a huge issue for data brokers and government seismic archives.”<ul style="list-style-type: none">– <i>Oil & Gas</i>“We don’t calculate TCO; we justify by requirements, cost, and cost of doing nothing.”<ul style="list-style-type: none">– <i>Medical</i>“We actually have two budgets – a reasonable one for new HW, and an unreasonably small one for the media.”<ul style="list-style-type: none">– <i>Government</i>

ENTERPRISE CUSTOMERS ARE INDIFFERENT TO THE ADVANTAGES OF ADVANCED OPTICAL DISK

EXAMPLE

Advanced Optical disk
advantage

Customer perspective

Longevity
Media life of 50 years instead of 30 years for magnetic tape and 10 years for digital video

“So what if the disk lasts longer? I have **no confidence that I’ll have the hardware and software to read it later.**”
- *Production data center*

“All the important data that needs to be kept around for longer than a year **gets refreshed onto new tapes automatically.** That’s the only way we can ensure that we’ll read it.”
- *Financial regulatory compliance*

“We just don’t value our archived local footage that heavily. When we moved recently we just **threw out our old tapes.**”
- *TV news archiving*

“The government actually regulates that we refresh our data on removable media every five years, so **even if we had a longer lasting media, we wouldn’t switch.**”
- *Large-scale data archiving*

Integrity
Physical WORM instead of emulation for magnetic tape

“We don’t view **physical WORM as necessary.**”
- *All interviewees*

Time-to-data
Average data access of 5 seconds instead of 30+ for magnetic tape

“We can’t have doctor’s waiting 5 seconds every time they pull up an image. Our preferred solution is to **keep everything on spinning disk.**”
- *Medical image archiving*

“With our backup windows shrinking and RTOs and RPOs* becoming much more aggressive, **we’ve moved to disk-to-disk** to do our standard backups. It’s the only way we can get an acceptable restore.”
- *Production data center*

The technical advantages for Advanced Optical disk in the enterprise space do not meet any outstanding needs.

* RTO = recovery time objective; RPO = recovery point objective
Source: Interviews; team analysis

OBSOLESCENCE CONCERNS A BARRIER AND ARE AS MUCH ABOUT SOFTWARE AS ABOUT HARDWARE

Customer perspective

- “With optical there is always the questions ‘Will I have a drive in 10 years? In 50 years?’ ”
 - *Government*
- “I know that I can always project film. This is never true in digital media”
 - *Media*
- “To be honest, I keep the media in Iron Mountain. There will be a point of time that if the lawyers want it I’ll have to say – Got it, can’t read it or can read it but don’t understand it”
 - *Medical*
- “If someone forgot to archive the application, then what? I have data I cannot translate”
 - *Financial*
- “We are accepting 6 new formats for archiving – The new initiative will have to tell us how we can guarantee that we can always read it and translate it”
 - *Government*

Interpreted perspective

- Obsolescence is a key barrier to adoption of digital archiving in paper, video and film segments
- Obsolescence is also an unmet need for current users of digital archiving media, which are open to “out of the box” solutions
- Obsolescence concerns evolve around HW and SW
 - Standards for magnetic tape are perceived as stable
 - Optical disk standards are perceived as constantly changing
 - SW obsolescence concerns are as high as HW concerns, particularly around backward compatibility of new applications with archived data